

Chapter 1. General Introduction

The South Bay Ocean Outfall (SBOO) discharges treated effluent to the Pacific Ocean that originates from two separate sources: the International Wastewater Treatment Plant (IWTP) and the South Bay Water Reclamation Plant (SBWRP). Wastewater discharge from the IWTP, which is owned and operated by the International Boundary and Water Commission (USIBWC), began in January 1999 and is performed under the terms and conditions set forth in Order No. 96-50, Cease and Desist Order No. 96-52 for National Pollutant Discharge Elimination System (NPDES) Permit No. CA0108928. Discharge from the City of San Diego's SBWRP began in May 2002 and is currently performed according to provisions set forth in Order No. R9-2006-0067 for NPDES Permit No. CA0109045. The Monitoring and Reporting Programs (MRPs), specified in the above orders define the receiving waters monitoring requirements for the South Bay coastal region, including sampling design, compliance criteria, types of laboratory analyses, and data analysis and reporting guidelines.

All MRP mandated monitoring for the SBOO region has been performed by the City of San Diego since wastewater discharge began in 1999. The City also conducted 3½ years of pre-discharge monitoring in order to provide information against which post-discharge conditions may be compared (City of San Diego 2000a). Additionally, the City has conducted region-wide surveys off the coast of San Diego each summer since 1994 as part of regular annual monitoring requirements (e.g., City of San Diego 1998, 1999, 2000b, 2001–2003, 2006–2011) or during participation in larger, multi-agency surveys of the entire Southern California Bight that occur approximately every five years (e.g., Bergen et al. 1998, 2001, Noblet et al. 2002, Ranasinghe et al. 2003, 2007, 2012, Schiff et al. 2006). Such large-scale surveys are useful in characterizing the ecological health of diverse coastal environments and in distinguishing

reference areas from sites impacted by wastewater discharges, stormwater discharges, urban runoff, or other sources of contamination.

Finally, the City and USIBWC also fund a remote sensing program for the San Diego/Tijuana region as part of the monitoring efforts for the Point Loma and South Bay outfall areas. This program, conducted by Ocean Imaging, Inc. (Solana Beach, CA) uses satellite and aerial imagery data to produce a synoptic picture of surface water clarity that is not possible using shipboard sampling alone. With public health issues being of paramount concern for ocean monitoring programs in general, any information that helps to provide a clearer and more complete picture of water conditions is beneficial to the general public as well as to program managers and regulators. Complete results of the remote sensing program conducted during calendar year 2011 are summarized in Svejksky (2012).

This report presents the results of all receiving waters monitoring activities conducted for the South Bay outfall monitoring region in 2011. Included are results from all fixed stations that comprise a grid surrounding the SBOO, as well as results from the July 2011 regional benthic survey of randomly selected sites off San Diego. Satellite imagery observations made during the year as reported by Svejksky (2012) are also considered and integrated into interpretations of oceanographic and water quality data. Comparisons are also made to conditions present during previous years in order to evaluate spatial and temporal changes that may be related to wastewater plume dispersion or to other anthropogenic or natural factors. The major components of the monitoring program are covered in the following chapters: Oceanographic Conditions, Water Quality, Sediment Conditions, Macrobenthic Communities, Demersal Fishes and Megabenthic Invertebrates, Bioaccumulation of Contaminants in Fish Tissues, Regional Sediment Conditions, and Regional Macrobenthic Communities. Some

general background information on program design and sampling procedures for the regular fixed-grid monitoring and regional surveys are given below and in subsequent chapters and appendices.

REGULAR FIXED-GRID MONITORING

The SBOO is located just north of the border between the United States and Mexico. The outfall terminates approximately 5.6 km offshore at a depth of about 27 m. Unlike other southern California ocean outfalls that lie on the surface of the seabed, the pipeline first begins as a tunnel on land and then continues under the seabed to a distance of about 4.3 km offshore. From there it connects to a vertical riser assembly that conveys effluent to a pipeline buried just beneath the surface of the seabed. This subsurface pipeline then splits into a Y-shaped multiport diffuser system (i.e., wye), with the two diffuser legs extending an additional 0.6 km to the north and south. The outfall was originally designed to discharge wastewater through 165 diffuser ports and risers, which included one riser at the center of the wye and 82 others spaced along each diffuser leg. However, persistently low flow rates have required closure of all ports along the northern diffuser leg and many along the southern diffuser since discharge began in order for the outfall to operate effectively. Consequently, wastewater discharge is restricted primarily to the distal end of the southern diffuser leg, with the exception of a few intermediate points at or near the center of the wye.

The regular sampling area for the SBOO region extends from the tip of Point Loma southward to Playa Blanca, northern Baja California (Mexico), and from the shoreline seaward to a depth of about 61 m (Figure 1.1). The offshore monitoring sites are arranged in a grid surrounding the outfall, with each station being sampled in accordance with NPDES permit requirements. Sampling at these fixed (core) stations includes monthly seawater measurements of physical, chemical, and bacteriological parameters to document water quality conditions in the area. Benthic sediment samples are collected

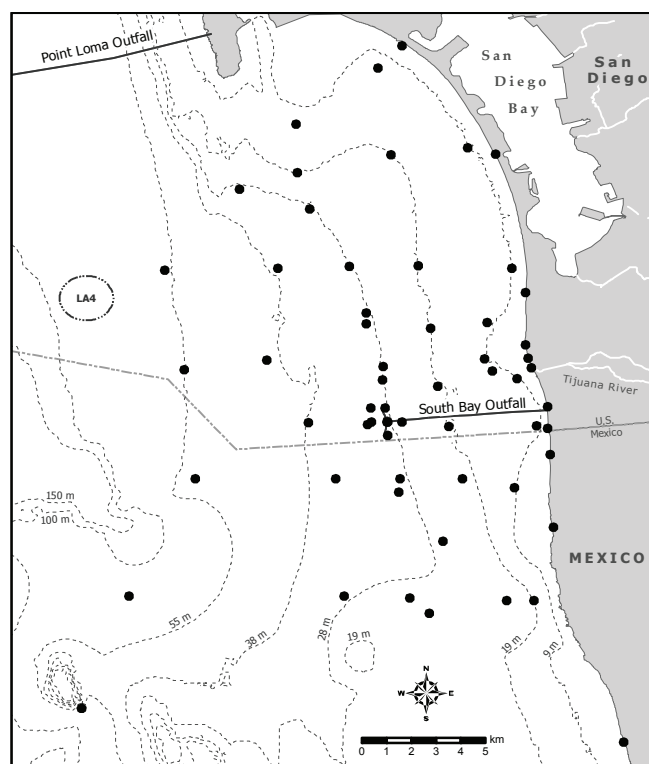


Figure 1.1

Receiving waters monitoring stations sampled around the South Bay Ocean Outfall as part of the City of San Diego's Ocean Monitoring Program.

semiannually to evaluate macrobenthic invertebrate communities and sediment conditions. Trawl surveys are performed quarterly to monitor communities of demersal fish and large, bottom-dwelling invertebrates (megabenthos). Additionally, analyses of fish muscle and liver tissues are performed semiannually to assess the bioaccumulation of chemical constituents that may have ecological or public health implications.

RANDOM SAMPLE REGIONAL SURVEYS

In addition to the core fixed-station sampling, the City typically conducts a summer benthic survey of sites distributed throughout the entire San Diego region as part of the monitoring requirements for the South Bay outfall program. These surveys are based on an array of stations that are randomly selected by the United States Environmental Protection Agency (USEPA) using the probability-based Environmental Monitoring

and Assessment Program (EMAP) design. Benthic surveys conducted in 1994, 1998, 2003, and 2008 were broader in scope, involved other major southern California dischargers, and included sites representing the entire Southern California Bight (SCB) from Point Conception, California to Cabo Colonet, Northern Baja California. These surveys included the Southern California Bight Pilot Project (SCBPP) in 1994, and the SCB Regional Monitoring Programs in 1998, 2003 and 2008 (Bight'98, Bight'03, and Bight'08, respectively). Results of the 1994–2008 regional programs are available in Bergen et al. (1998, 2001), Schiff and Gossett (1998), Noblet et al. (2002), Ranasinghe et al. (2003, 2007, 2012), and Schiff et al. (2006, 2011). A separate regional survey for San Diego was not conducted in 2004 in order to conduct the first phase of a sediment mapping study (see Stebbins et al. 2004, City of San Diego 2005).

The same randomized sampling design was used to select 40 new stations per year for each of the summer surveys restricted to the San Diego region in 1995–1997 and 1999–2002. Beginning in 2005, however, an agreement was reached between the City, USEPA and San Diego Regional Water Quality Control Board to revisit sites successfully sampled 10 years earlier in order to facilitate comparisons of long-term changes in benthic conditions. During some of these follow-up surveys, a limited number of stations could not be revisited due to the presence of rocky substrates that made it impossible to collect benthic grab samples. Thus, 36 sites were revisited in 2005, 34 sites in 2006, and 39 sites in 2007. As indicated above, a separate survey for the San Diego region was not conducted in 2008 due to participation in Bight'08. In 2009, sampling was conducted at the 34 sites originally sampled in 1999 as well as six additional new sites located further offshore in waters deeper than 200 m (see City of San Diego 2010). These latter six stations were added to provide information on deeper continental slope habitats off San Diego. The summer 2010 regional survey involved sampling 40 new randomly selected stations provided by EPA and distributed between continental shelf (<200 m) and upper slope (~200–500 m) depths.

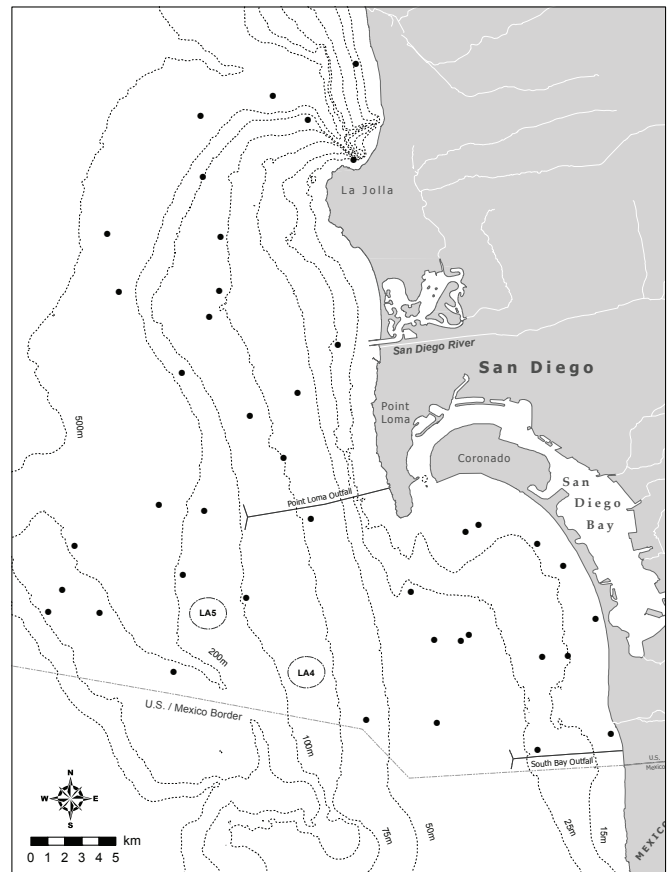


Figure 1.2

Regional benthic survey stations sampled during July 2011 as part of the City of San Diego's Ocean Monitoring Program.

The summer 2011 regional survey reported herein also involved sampling a total of 41 new randomly selected stations (Figure 1.2), which extended offshore from depths of about 10 to 427 m (see Chapters 8–9 for details).

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